

Identifying key risks to the achievement of protected area system objectives

Reece Alberts^{1,2}, Francois Retief^{1,2}, Claudine Roos^{1,2}, Dirk Cilliers^{1,2}, Willem Lubbe³

1 *Research Unit for Environmental Sciences and Management, North West University, Potchefstroom Campus, South Africa* **2** *Protected Areas Research Group, North West University, Potchefstroom Campus, South Africa* **3** *Faculty of Law, North West University, Potchefstroom Campus, South Africa*

Corresponding author: Reece Alberts (reece.alberts@nwu.ac.za)

Academic editor: Felix Ekardt | Received 14 March 2022 | Accepted 3 June 2022 | Published 30 June 2022

<http://zoobank.org/A087C1BE-178E-4DDA-BFDD-5053C2CFED34>

Citation: Alberts R, Retief F, Roos C, Cilliers D, Lubbe W (2022) Identifying key risks to the achievement of protected area system objectives. *Nature Conservation* 49: 53–75. <https://doi.org/10.3897/natureconservation.49.83759>

Abstract

Protected area systems are designed in law and policy towards achieving certain policy objectives. These systems rely on legal frameworks that determine how countries designate, declare and manage their protected areas. To date, little research has been conducted on the risks faced by protected area systems. To this end, this paper aims to identify the key risks for protected area systems achieving their objectives. This is achieved through the application of Theory of Change (ToC), which is internationally recognised as the preferred method to identify underlying assumptions and risks within policy and legal frameworks. We achieve this aim through a case study analysis of the South African protected area system as embedded in law and policy. The application of the ToC method identified 25 underlying assumptions and risks which are central to the protected area system achieving its objectives. Understanding these risks allows for a better understanding of the potential failure of the system and how to avoid it. The paper then explores and discusses the identified risks in terms of existing literature and concludes by making recommendations related to further research for the identified risks.

Keywords

assumptions, conservation areas, protected areas, protected area system, risks, Theory of Change

Risks facing protected area systems

Across the globe, areas have been set aside by governments for conservation or protection for well over a century, in attempts to protect and preserve landscapes, fauna, flora

and ecosystems (Watson et al. 2014; Gray et al 2016). According to the International Union for the Conservation of Nature (IUCN), the world now protects around 15% of its land, with more than 200 000 protected areas, covering almost 20 million square kilometres (IUCN 2016; Geldmann et al. 2019). Traditionally, these areas are set aside as a result of specific policy and legal interventions and frameworks (Strydom and King 2018), often in the form of legally recognised, proclaimed or declared areas dedicated for conservation, forming a specific protected area system (Lausche 2011). It is, however, apparent that these areas are facing increased risks, ranging from strategic to operational considerations, including *inter alia* changing climate, changing socio-political contexts and economic threats, to name only a few (Schulze et al. 2018; Geldmann et al. 2019).

Our literature review suggests that little research has, however, been conducted on the risks faced by protected area systems, that is to say, the policy and legal framework within which a particular country designates, declares and manages its protected areas. To this end, we propose the application of a specific approach that is used to determine the extent to which policies, plans and programmes achieve their objectives, namely the Theory of Change (ToC). The ToC has seen increased use for the identification of risks in conservation initiatives (Biggs et al. 2015; Biggs et al. 2017; Retief et al. 2022) in recent years, focusing specifically on certain interventions or programmes (Biggs et al. 2015; Balfour et al. 2019; Retief et al. 2022). The authors propose that ToC may, however, be applied to evaluate a particular legal and policy framework underlying a country's protected area system.

ToC is a process-orientated method that is aimed at questioning the assumptions that are often side-lined when considering, for example, whether legal and policy frameworks achieve their objectives. In order to distil specifically the risks facing a particular protected area system, this paper applies ToC as a method to identify key assumptions underlying the policy and legal framework for protected area systems, and in so doing, translate those assumptions into risks for the protected area system achieving its objectives.

The aforementioned is achieved through a case study analysis of the South African protected area system, which has a long and proud history of conservation through an extensive network of protected areas. South Africa's protected area system dates back to the turn of the 19th century, with the proclamation of the first protected area in Africa in 1894 - the Pongola Nature Reserve. In 1926, the National Parks Board was established through the National Parks Act 56 of 1926 (Union of South Africa 1926), which together with numerous provincial ordinances saw the formation of different types of protected areas across the country, including among others, national parks, provincial parks, municipal reserves and private nature reserves. The current protected area system in South Africa is centred around the National Environmental Management Protected Areas Act 57 of 2003 (RSA 2003) (NEMPAA), which makes provision for the declaration of nine differing protected areas, cascading from strictly protected to least protected. To date, South Africa has more than 1500 protected areas, across the different types and protection levels. Of these, approximately 9.9% are terrestrial and 5% are Marine Protected Areas

[comprising roughly 5% of the coastal and marine areas (DEFF 2021)]. In the following section, we start by explaining the ToC approach to identify key risks for the protected areas system in South Africa.

A preferred method for identifying key risks – Theory of Change (ToC)

Recent years have seen a significant increase in the use of ToC, especially in the field of evaluation of public law and policy (McConnell 2019; Alberts et al. 2020), with many international agencies considering ToC as a best practice evaluation method (USAID 2015). Ultimately, ToC produces a conceptual framework and a related causal narrative to identify underlying risks to the successful implementation of a particular initiative. The causal narrative is explained and structured around a sequence of different so-called evaluation components namely: design, inputs, activities, outputs, outcomes and impacts (Weiss 1995; Connell and Kubisch 1998; Thornton et al. 2017), typically illustrated and explained in the ‘results-based pyramid’ shown in Fig. 1. Applying the ToC method to the South African protected area system would require adapting and contextualising the six generic questions as outlined in Fig. 1.

As a contribution to knowledge, this paper is only concerned with ToC as a means to identify key assumptions and, ultimately, risks for protected area systems meeting their objectives as set out in policy and law. Although applied to the South African context, the authors believe the results are generally applicable to similar protected area systems around the world.

In applying the ToC method to the South African protected area system, the following three steps were followed:

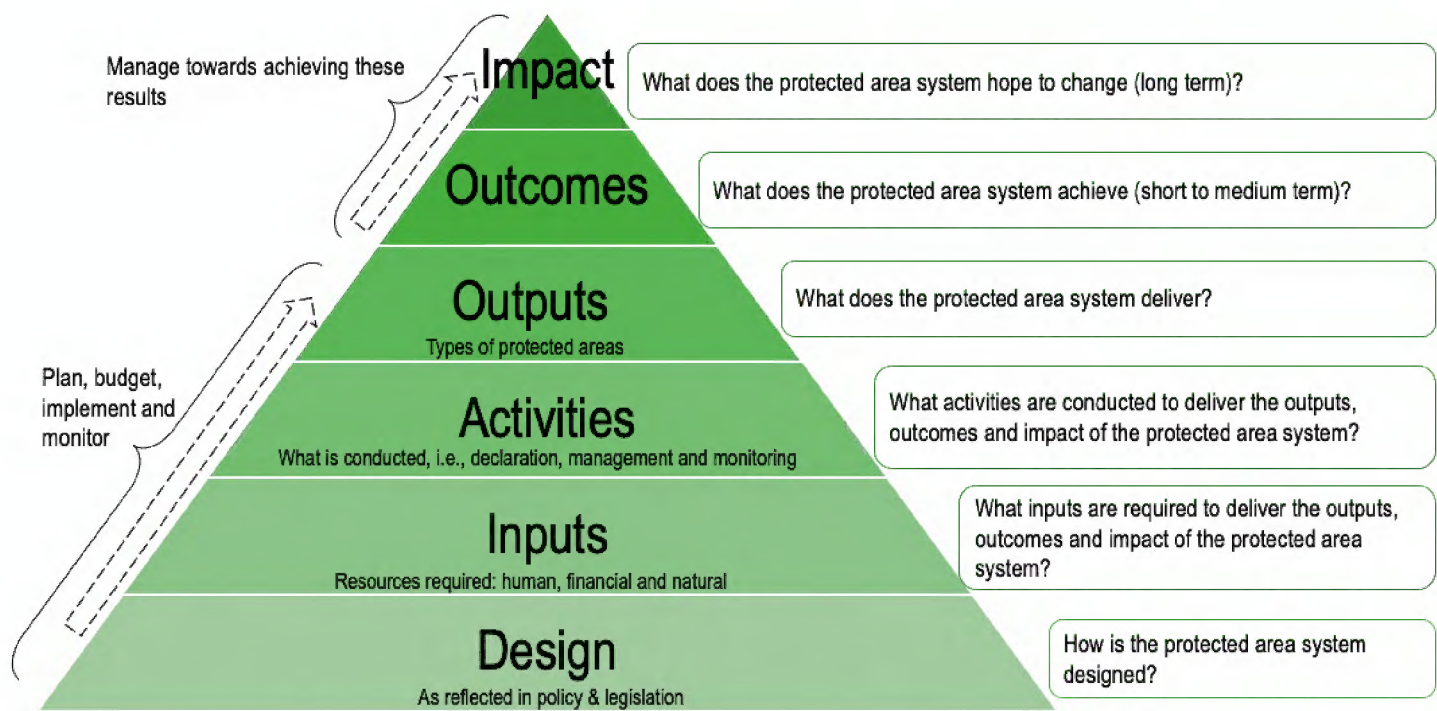


Figure 1. Results-based pyramid for protected areas systems adapted from (DPME 2011 and Retief et al. 2022).

- **Step 1: Specialist workshop:** The initial version of the ToC map with causal narrative and assumptions were developed through a specialist workshop between five specifically identified specialist with experience in conservation and, especially protected areas, in South Africa. All had PhD qualifications and represented the following four fields of expertise: conservation planning, conservation law, and environmental impact assessment and conservation science. They were tasked to apply the results-based pyramid structure to protected areas and to develop a draft ToC map with a causal narrative, purely based on their specialist opinion and experience.
- **Step 2: Stakeholder verification:** The draft ToC map with causal narrative and assumptions was next presented at a broader stakeholder forum to further test its accuracy. Represented at these stakeholder forums were NGOs, government departments, the private sector, private conservation landowners and academia. The forum aimed to provide an opportunity for different stakeholders outside of the specialist group to also provide inputs on the accuracy of the ToC map, causal narrative, assumptions, and risks identified. Ultimately, four such forums were held at different locations throughout South Africa to ensure maximum opportunity to participate. The forums were well attended by more than 100 representatives from diverse stakeholder groups.
- **Step 3: Final specialist workshop:** A final ToC specialist workshop was held by the same specialists involved in Step 1, to reflect on all comments received from the stakeholders. Stakeholder feedback mainly contributed towards refining the input component and confirming the overall ToC conceptual framework and narrative developed during Step 1. The stakeholder verification was required to affirm the robustness of the ToC results.

ToC results – Key risks underpinning the protected area system in South Africa

This section explains the ToC conceptual framework illustrated in Fig. 2, as well as the causal narrative and related key assumptions, which will translate into the underlying risks (Table 1). The content of the framework is the outcome of Steps 1 to 3 set out above. In essence, the ToC framework is an exploded view of our understanding of how the protected area system in South Africa functions. It addresses the causal logic between the design, inputs, activities, output, outcome and impact evaluation components from the ‘results-based pyramid’ in Fig. 1. Ultimately, it provides an illustration of the causal logic between different system components (i.e. design, inputs, activities, outputs, outcomes and impacts) and underpins the ToC narrative and logical framework to be discussed in detail below.

- The ToC narrative is framed against the different system components i.e. design, inputs, activities, outputs, outcomes and impacts.
- The ToC narrative in essence suggests the following causal logic statement:
- The South African protected area system is embedded in legislation (design component), and relies on various inputs (land, conservation value, infrastructure, budget) including a certain level of skills and competencies (input component) to create and manage protected areas (activity component), that results in one of nine

possible formally declared protected areas (output component), to deliver on the objectives of the National Environmental Management Protected Areas Act (outcome component), and in so doing, progressively giving effect to the environmental right contained in Section 24 of the Constitution (impact component).

• The narrative of the causal logic reflected in Fig. 2 should be read from left to right, starting with a discussion of the design and input components. The ‘key assumptions’ numbered 1 to 25 are indicated in Fig. 2 and set out in Table 1. These are explained in more detail in the following sections. We recommend to the reader to first read the following sections and then relate that back to Fig. 2 and Table 1. Moreover, to deal with the causal relationship between different components they are discussed sequentially.

Design component

Design and input components deal with the resources that contribute to the delivery of the activities and output components (Weiss 1995; Connell and Kubisch 1998; DPME 2011; Thornton et al. 2017). In this case, the design components relate to the design of the South African protected area system as reflected and prescribed in protected areas legislation. Ultimately, the protected area system is embedded in legislation that allows for the declaration of a particular geographical area, regulation by the competent authority and management by the appointed management authority. The design of the protected area system in South Africa is founded on the environmental right as contained within Section 24 of the Constitution and must be read within the National Environmental Management Act (NEMA) Section 2 principles (RSA 1998) (Strydom and King 2018; Goosen and Blackmore 2019; Retief et al. 2022). This right entrenches the notion that every person has the right to an environment that is not harmful to their health or well-being whilst embodying the concept of sustainable development and ensuring that the

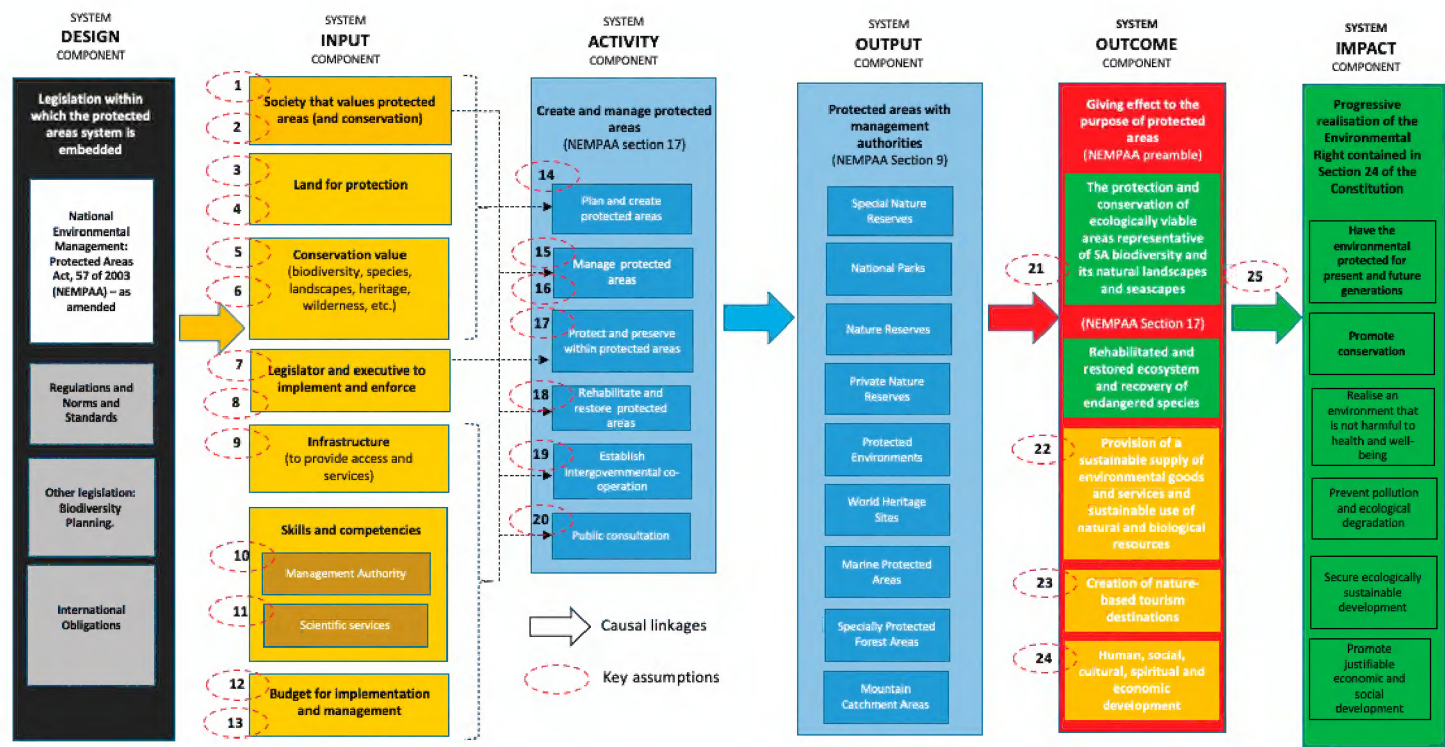


Figure 2. ToC map for the South African PA system.

Table 1. Underlying assumptions of and key risks to the protected areas system in South Africa.

ToC components	Assumptions It is assumed that ...	Key risks to the protected area system
Input component		
Society that values conservation	1. The majority of society values protected areas.	1. The majority of society does not value protected areas.
	2. The majority of society values conservation.	2. The majority of society does not value conservation.
Land available for conservation/protection	3. The current land/property rights system will remain in place.	3. The current land/property rights system changes.
	4. Conservation can prevail into the future as a preferred land use for existing protected areas.	4. Conservation cannot prevail into the future as a preferred land use for existing protected areas.
Conservation value	5. We can define and agree on which areas have conservation value.	5. We cannot define and agree on which areas have conservation value.
	6. The conservation value of the area which is to be conserved and protected will remain.	6. The conservation value of protected areas will change over time.
Legislator and executive to implement and enforce laws	7. There will be enforcement of protected areas and conservation laws.	7. There is no enforcement of protected areas and conservation laws.
	8. Protected areas boundaries are accepted, respected and enforced.	8. Protected areas boundaries are not accepted, not respected and not enforced.
Infrastructure	9. Supporting infrastructure within protected areas will be provided and if so it will be for the promotion of conservation.	9. There will be no provision of supporting infrastructure within protected areas to promote conservation.
Skills and Competencies	10. Those managing protected areas value conservation.	10. Those who are managing protected areas do not value conservation.
	11. Leadership, management and scientific competence exists to manage protected areas.	11. Management authorities do not have sufficient leadership, management and scientific skills.
Budget	12. Government will budget for state managed protected areas creation and management	12. Government will not budget for state managed protected areas creation and management.
	13. Protected areas can “pay their way” i.e., they are economically viable.	13. Protected areas cannot “pay their way” i.e., they are economically unviable.
Activity component		
Plan and create/proclaim protected areas	14. Conservation can prevail as a preferred land use outside of existing protected areas.	14. Conservation is not considered to be a preferred land use outside existing protected areas.
Manage protected areas	15. All protected areas have management authorities.	15. Management authorities are not appointed for PAs or are not competent.
	16. All protected areas can comply with the relevant laws, regulations and norms and standards.	16. Protected areas and management authorities cannot comply with the relevant laws, regulations and norms and standards.
Protect, preserve and conserve	17. Those trained in conservation can sufficiently manage protected areas and deal with protection actions (i.e. anti-poaching)	17. Management authorities and those trained in conservation do not have capacity to deal with conservation and protection actions (i.e. anti-poaching).
Rehabilitate and restore	18. Management authorities have the capacity to rehabilitate and restore degraded systems.	18. Management authorities do not have the capacity to rehabilitate and restore degraded systems.
Establish intergovernmental cooperation	19. Cooperative governance exists between the management authority and different organs of state and spheres of government.	19. Cooperative governance does not exist between the management authority and different organs of state and spheres of government.
Public consultation	20. The public can be meaningfully consulted on protected areas and conservation related matters.	20. The public cannot be, or is not meaningfully consulted on protected areas and conservation related matters.
Outcome component		
Protection and conservation	21. Sufficient land can be formally secured (under different types of formal protection) to deliver protection and conservation of ecologically viable areas representative of SA biodiversity and its natural landscapes and seascapes.	21. Sufficient land/areas cannot be formally secured (under different types of formal protection) to deliver protection and conservation of ecologically viable areas representative of SA biodiversity and its natural landscapes and seascapes.
Sustainable supply and use	22. Protected areas can provide a sustainable supply of environmental goods and services to communities.	22. Protected areas do not provide a sustainable supply of environmental goods and services to communities.
Nature-based tourism	23. There is a link between tourism locations and conservation value.	23. A link does not exist between viable nature-based tourism locations and conservation value.

ToC components	Assumptions It is assumed that ...	Key risks to the protected area system
Human, social, cultural, spiritual and economic development	24. Protected areas can deliver human, social, cultural, spiritual and economic development.	24. Protected areas do not, or cannot, make a contribution to human, social, cultural, spiritual and economic development.
Impact component		
Progressive realisation of S24 environmental right	25. Protected areas will contribute to the progressive realisation of the environmental right contained in Section 24 of the Constitution.	25. Protected areas do not contribute to the progressive realisation of the environmental right contained in Section 24 of the Constitution.

state pursues conservation initiatives through reasonable legislative steps or other means. The principles set out in Section 2 of NEMA direct all government actions and decisions towards the promotion of sustainable development (see also discussion under impact component). Moreover, the principles serve as guidelines applicable to all functions exercised in terms of NEMA or any statutory provision concerning the protection of the environment (NEMA s 2(1)(c)). It is recognised that protected areas are a reasonable measure in terms of contributing toward the achievement of Section 24 (Retief et al. 2022).

The main legislative instrument driving the formalisation of protected areas in South Africa is the NEMPAA (RSA 2003). The objectives of the Act include: prescribing a national framework for the declaration and management of protected areas; providing for cooperative governance about declaration and management; entrenching a national system of protected areas as part of a broader strategy to manage and conserve biodiversity; entrenching a representative network of protected areas on state, private and communal land; promoting the sustainable use of protected areas for the benefit of all; and promoting the participation of local communities. The NEMPAA contains a diverse array of provisions for achieving these objectives. Included in these provisions is the suit of protected areas, each with differing status, but all ultimately adding to the South African conservation estate. Considering the design component, the following statement is made. The current design of the South African protected area system is well described and vested in law, and provides for the recognition, declaration and management by an appointed management authority of a protected area.

Input component

The input component deals with the resources that are required for the delivery of the activities and the output component (Weiss 1995; Connell and Kubisch 1998; DPME 2011; Thornton et al. 2017). The process of identifying the key inputs for the South African protected area system resulted in intense deliberation during the development of the causal narrative. This is a result of the myriad of possible inputs ranging from small operational factors (such as day to day protected area management) to larger strategic and systemic inputs (for example implementation of protected areas expansion strategies), coupled with the fact that the inputs are not explicitly provided for in legislation (unlike for the outcome and impact components). Therefore, this section shares what was considered to be the key inputs as identified and agreed upon during steps one to three in the ToC process, and as summarised in the second column of Fig. 2.

The protected area system in South Africa requires firstly a society that values protected areas and conservation. The rationale is that the entire system is based on laws passed by a democratically elected government. In theory, should society not value conservation, the elected law makers, representing the people in parliament, can be mandated to amend or withdraw the protected area legislation in line with the democratic law-making process. A sobering fact is that for the de-proclamation of a national park, arguably the apex of the South African protected area system, a majority vote of 50% plus one of the quorum is required in the National Assembly. Such potential actions are, however, counterbalanced in the South African context by amongst others, the fiducial duties placed upon the state by section 3 of NEMPAA. The state in terms of this section is required to act as the trustee of the country's protected areas and to work with other actors to progressively achieve section 24 of the Constitution (Blackmore 2018; Blackmore 2022). There is, however, legal uncertainty as to the consequences should this obligation be disregarded as there is no explicit provision in NEMPAA that binds the political head and the relevant legislature to ensure that the downsizing or degazetting of a protected area does not compromise the objective and intent of this Act (Blackmore 2022). A potentially further limiting factor for such actions would be the state's ratification of the international instruments in relation to conservation and biodiversity commitments such as the Convention on Biological Diversity (CBD) and the Aichi Targets (Strydom and King 2018). Conservation worthy areas or marine areas for conservation is a further input into the protected area system with the NEMPAA referring to ecologically viable areas representative of South Africa's biodiversity and its natural landscapes and seascapes. For the protected area system to function there is a requirement for the legislator and the executive to implement and enforce the protected area laws which have been passed. Relevant infrastructure is required to allow for the management and operation of protected areas in line with relevant objectives. Arguably, one of the most important inputs is that relating to skills and competencies, because for protected areas to function properly, sound leadership, management, and scientific skills are required, coupled with competent management authorities. Lastly, a listing of the above inputs is of no value without the requisite financial budgets and resources to implement the protected area system.

Activity component

The ToC approach determines that the activity component deals with the process or actions that use the inputs (described in the previous section) to produce the desired output and ultimately the desired outcomes (Weiss 1995; Connell and Kubisch 1998; DPME 2011; Thornton et al. 2017). The activities related to protected areas are derived from the relevant South African protected area policy framework and legislation, as well as from the workshops with relevant stakeholders. The third column in Fig. 2 summarises these activities to include: plan and declare; manage; protect, preserve and conserve; rehabilitate and restore; establish intergovernmental cooperation; public consultation; and reporting.

The activity components related to the South African protected area system, centre around the creation and management of protected areas. In essence, the individual

protected areas have to be planned, established and managed. (It is recognised that many South African protected areas pre-date NEMPAA and have therefore already been established, enjoying continued legal status as a result of NEMPAA's transitional provisions). Activities related to the protected area system also include the protection and preservation of resources within the protected areas and the rehabilitation and restoration of degraded areas within protected areas. Furthermore, the legal and policy framework expects activities related to the establishment of intergovernmental cooperation and public consultation to take place.

Output component

The output component represents the outputs culminating from the design, inputs and activities components. In the case of South Africa's protected area system, the actual output is a declared protected area, which is managed towards achieving its objectives. This declared protected area falls within one of the nine protected area types as listed under the outputs column in Fig. 2 and as contained within Section 9 of the NEMPAA.

Outcome component

The outcome component entails that which should be achieved by the particular output. In the case of the South African protected area system, with the output being a particular form of protected area, the outcome will be the actual purpose for which protected areas are established as set out in terms of the legislation. It is recognised that this purpose may change over time (Doak et al. 2015) and that follow-up ToC exercises may be required to account for these changes to ensure that the outcome component reflects that which is expected to be achieved. Within the current system, the outcomes of the protected area system are: The protection and conservation of ecologically viable areas representative of South Africa's biodiversity and its natural landscapes and seascapes. Further outcomes as set out in NEMPAA include:

- The rehabilitation and restoration of ecosystems together with the recovery of endangered species;
- Provision of a sustainable supply of environmental goods and services and sustainable use of natural and biological resources;
- Creation of nature-based tourism destinations; and
- Human, social, cultural, spiritual, and economic development.

Impact components

The impact component represents the results of achieving certain outcomes (DPME 2011). In this case, the impact component relates to the extent to which protected areas are giving effect to the progressive realisation of the environmental right contained

in Section 24 of the South African Constitution (RSA 1996). The ultimate aim of South African protected area policy and legislation is the realisation of section 24 of the Constitution which reads:

“Everyone has the right –

- (a) to an environment that is not harmful to their health or well-being; and
- (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –
 - (i) prevent pollution and ecological degradation.
 - (ii) promote conservation; and
 - (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

Specifically, protected areas aim to achieve this as stated in the preamble of the NEMPAA through delivering the objectives set for protected areas in that Act.

Table 1 contains the differing ToC components and the related assumptions as distilled in the ToC map and causal narrative. Based on the ToC causal narrative and key assumptions, 25 key risks are identified. Table 1 provides a summary of the key risks as distilled from the assumptions described.

Exploring the risks for the South African protected area system

Twenty-five risks have been distilled for the South African protected area system, through the application of the ToC. Although focused on the South African context, the authors believe that many of these risks are generalisable to other protected area systems internationally. In discussing the identified risks, the authors have attempted to synthesise some of the main international and South African debates. The risks are discussed fluidly and are broached in terms of how they concern one another. Likewise, it would be one-dimensional to attempt to list or rank the risks as they are interrelated and causal. What influences the likelihood of one risk being realised, might be the result of factors influenced by the manifestation of any of the other identified risks, as will be illustrated below.

It is imperative, more so, within a democratic environment, that the majority of society values PAs and conservation (Risks 1 and 2). It is the support of society, which in essence allows for the adoption and passing of the legal and policy mechanisms, which underpin and support protected area systems. Should society not value conservation or protected areas, the entire system may be at risk, as the legal foundation may be amended to reflect the sentiments of broader society. Simply put, should broader society's sentiments not reflect positively on conservation then the legal framework should follow suit. Such changes to the legal system do not happen overnight, and although highly unlikely, the risk remains that South Africa's protected areas' legislation may be amended should popular opinion demand so. More worrying is the aspect highlighted

above regarding de-proclamation where political opinion can effect changes to the conservation estate established in terms of protected area legislation. de Marques and Peres (2015) described this practice within the Brazilian context as being a pervasive legal threat to protected areas. The authors cite examples of where the Brazilian legal system was correctly used, in a disingenuous manner, to degazette, downsize or downgrade several of the country's protected areas (de Marques and Peres 2015; Blackmore 2022). The supporting reasons for such actions were evidently to accommodate state infrastructure, relax restrictions on land use or the use of natural resources by people, or as a result of conflicting interests with the wider private sector (de Marques and Peres 2015).

Within the South African context NEMPAA allows for the Minister to withdraw a declaration of certain protected areas by resolution of the National Assembly (NEMPAA s24(1)(a)). In essence, this means that a majority of the quorum of the National Assembly holds the political power to 'de-proclaim' certain protected areas. The decision could be taken on administrative review under the argument that the de-proclamation was arbitrary and not in line with the responsibilities relating to trusteeship under section 3 of NEMPAA and those agreed to under various international conventions. Such an act may furthermore be seen to be contrary and counterintuitive to section 24 of the Constitution. Nonetheless, this is a risk and could result in lengthy and costly litigation.

The question of whether society values conservation or protected areas has been dealt with in the literature to some extent, often on how people or tourists value a particular type of protected area, such as nature reserves or marine protected areas (Apps et al. 2019). However, any discussion relating to how people value nature is perplexing, in part because of varying terms and contexts (Tadaki et al. 2017). Recent literature (Pearson 2016; Sandbrook et al. 2019; Pascual et al. 2021) recognises that debates around how to value conservation are resulting in more nuanced framings, which recognise the complexity of the relationship between humans and biodiversity and incorporate different ways of valuing nature. Within the South African context, Tanner et al. (2010) recognise that protected areas are faced with diverse demands, reflecting shifting value sets in society. Tanner et al. (2010) contends that for protected areas to survive (especially within the democratic context), they must recast their values and objectives to align with societal values. The point is that - if society does not value protected areas or conservation or deems that the values which these areas stand for are incompatible with their own, then the legitimacy of such areas may be called into question. Manfredo et al. (2017), however, highlight that there has been little serious attention in conservation paid to the fields of investigation that address values, how they are formed and how they change. They call for an urgent need to research values with a multi-level- and dynamic view that can inform innovative conservation strategies for working within existing value structures. It is argued that this might enhance the understanding of the role that values play in shaping conservation challenges (Manfredo et al. 2017). We thus argue that until it is fully understood to what extent a democratic society especially values conservation or protected areas, this remains a potential risk for the specific protected area system.

Risk 3 materialises when the current land use system changes. Protected areas in South Africa are a specific land use but are also surrounded by areas designated for

specific uses, such as agriculture or buffer zones comprising other forms of protected areas. Land use change around protected areas may reduce their effective size and limit their ability to reach or maintain conservation targets or objectives (Hamilton et al. 2013). It is, thus, important that the drivers for surrounding land use change are well understood, together with the threats or opportunities that these might hold, as future land use change is a vital consideration when investing limited conservation resources (Hamilton et al. 2013). This relates to Risk 4 which is realised when conservation cannot prevail as the preferred land use for current protected areas. If this risk is realised, then the protected area is downgraded, downsized or degazetted. This is colloquially referred to as protected area downsizing, downgrading or degazetting (PADD) (Mascia and Pailler 2011; Qin et al. 2019; Blackmore 2022). As pressure increases for access to resources within formally declared protected areas, raising questions around the most preferred or economically beneficial use of areas, many countries have heeded the developmental call to PADD certain areas. Although numerous examples exist (Mascia and Pailler 2011; Blackmore 2022), more recent examples include the granting of mining permissions within the Selous Game Reserve, Tanzania. This Reserve hosts 48 mining concessions (WWF 2017) with conflicting reports in the media as to whether mining will be permitted in the reserve or not (WWF 2017 and Business Daily 2018a, 2018b), and the question being addressed by the EU parliament to explain its support of the projects (EU 2018). The area is already under pressure from potential commercial logging and a planned hydroelectric project (Business Daily 2018a). A further example is the proposed copper mining in the Zambezi National Park after an Australian mining company was awarded mining rights by the Zambian Government and the Zambian High Court after an appeal (Africa Geographic 2021). The above cases serve to illustrate the risk of competing land uses potentially outweighing conservation and the resultant trade-off decision that must be made. Consequently, Risk 5 is potentially realised. If society, together with the authorities, cannot decide and agree on which resources have conservation value, it will then be difficult to establish or expand on a protected area system (Risk 5) or to protect and further conserve the current protected areas in perpetuity. Risk 5 may manifest in two ways, firstly, in the form of PADD if alternative or competing land uses are deemed more important than conservation as addressed in Risks 3 and 4 above. Secondly, it may hamper the formation and declaration of new protected areas, where the conservation-worthiness of an area might be challenged or questioned. Read with Risk 4 and 5 is Risk 14. If conservation is not considered to be a preferred land use outside current protected areas (see Risk 4 and 5), then the activity related to the planning and declaration of new protected areas will likely not occur.

Risk 6 manifests when the state of protected areas changes. Changes may accrue due to, for example, climate change or surrounding land use change, which have impacted negatively on the protected area (Belote et al. 2017). The risk is that the conservation-worthiness of the area has thus been diminished, resulting in Risks 3, 4 and 5 coming into play.

One of the most probable risks to materialise is the one related to the enforcement of conservation and protected area laws (Risk 7). This, together with Risk 8, which

relates to the fact that protected area boundaries are not recognised or respected, poses numerous risks to any protected area system. The importance of law enforcement for protected areas and the negative consequences of ineffective law enforcement for conservation in such areas are not disputed (Tranquilli et al. 2014; Fischer et al. 2014; Henson et al. 2016; Akella and Cannon 2017). The nature and form that these law enforcement efforts should take are, however, debatable (Fischer 2008; Inogwabini 2020) with numerous strategies and models being presented from strict militarised areas to more community-orientated enforcement approaches. Within the South African context, the challenges faced by effective law enforcement in protected areas are a stark reminder of the scale of the risks posed by threats to protected areas such as poaching, illegal fishing and illegal harvesting of natural resources (Biggs et al. 2013; Critchlow et al. 2017). Risk 16 deals with the possibility of the appointed management authority not being able to comply with the relevant applicable, laws, regulations or norms and standards in undertaking their management activities. The complex framework of laws in South Africa regulating conservation management activities, which are fragmented along national and provincial lines over numerous Acts, regulations and ordinances (Strydom and King 2018) makes it difficult for management authorities to ensure compliance with their own activities, let alone enforce compliance.

Risk 8 is strongly linked with Risk 7, with clearly demarcated and enforced boundaries being considered as an important measure to reduce risks to protected areas posed by external pressures specifically (Alers et al. 2007). The notion is that the first step to effective law enforcement is the need to establish protected area boundaries, which are physically delimited (Massé 2020). Massé (2020) highlights two main concerns related to protected area enforcement, namely the securing of spaces for conservation, and the second being to deter people from illegally entering protected areas and sanctioning those who do. Within the South African context, and notwithstanding poaching, the notion of protected area boundaries has been challenged in several instances where communities have entered protected areas and staked claims to land, two of the most recent cases being in 2019 and 2022 (Groenewald 2010; Magubane 2019; Carnie 2021, 2022).

Failure to provide the requisite infrastructure within protected areas (Risk 9) to promote conservation is a very real risk, related to budgetary constraints faced by many protected area management authorities. Infrastructure relates to not only conservation actions, such as fences, game pens, administration buildings and housing for staff but also to tourist facilities. The infrastructure needs of protected areas are often underestimated, leading to inadequate infrastructure and low levels of maintenance (Secretariat of the Convention on Biological Diversity 2008). The onset of the recent COVID-19 pandemic is a case in point, with conservation areas across the world, and specifically in Africa, facing severe financial constraints (Smith et al. 2021).

Key risks for protected areas relating to skills and competencies are that those responsible for managing protected areas do not value conservation (Risk 10) and that they do not possess the necessary leadership, management and scientific skills and competencies (Risk 11). Risk 10 is to be read with Risk 1 above and understood within a similar context. A failure to value conservation, coupled with poor salaries in many

conservation contexts (Smith et al. 2003; Child 2013) poses a risk to protected areas and conservation initiatives in the form of corruption, lack of enforcement and lack of general motivation by those responsible for managing protected areas (Whitfield 2003). The required skills and competencies for those employed within protected areas and conservation positions have been researched and are generally accepted (Blickley et al. 2013). It remains a risk, however, that employees with these skill sets do not apply for jobs. For example, Barlow et al. (2016) have identified a lack of project management skills within the conservation sector internationally. Likewise, Bruyere (2015) highlights the need for leadership skills in conservation management which go beyond mere scientific competence to also deal with strategic planning, interpersonal relationships, and conflict management (See also Clare 2018). Chardonnet (2019) in his assessment of Africa's protected areas states that there is no point in having protected areas if they are badly managed, calling for more quality protected areas rather than quantity. Risk 15 is coupled with Risks 10 and 11. We assume that management authorities will be appointed for declared protected areas, and if so, they will be competent to undertake the required management activities. The failure of government management authorities to effectively manage and protect protected areas has led to agreements with private actors such as African Parks, who manage in certain instances, state-owned protected areas on behalf of the governments with relevant agreements in place (Saporiti 2006). Such an intervention is yet to occur within the South African context, however.

Two very real risks facing protected area systems in general, and specifically in South Africa, are those relating to fiscal matters. Without fiscal backing, and a government budget to manage, let alone expand the protected area system (Risk 12), protected areas will be expected to pay their own way (Lindsey et al. 2021) (Risk 13). Watson et al. (2014) state that the under-resourcing of protected areas' management is the primary reason for poor performance in protected area effectiveness, especially in the developing world (see also Gill et al. 2017; Lindsey et al. 2021). Coad et al. (2019) have found that many protected areas lack the resources needed to guarantee effective biodiversity conservation. Using management reports from 2167 protected areas (with an area representing 23% of the global terrestrial protected area estate), the authors demonstrate that less than a quarter of these protected areas report having adequate resources in terms of staffing and budget. Literature suggests significant evidence that, globally, governments are sliding back on their commitments to support protected areas through disproportionate funding cuts and reduction in professional staff (Watson et al. 2014). Furthermore, the requirement for protected areas to pay their own way might be an impossible task as many protected areas do not lend themselves to becoming tourist destinations (Secretariat of the Convention on Biological Diversity 2008). This is often due to structural factors such as limited infrastructure availability (hotels, roads), market development, accessibility, security and services. This also addresses Risk 23, which assumes that a meaningful link exists between viable nature-based tourism destinations and conservation value. If this assumption is not true, then it will be difficult for the protected area to justify its existence economically. Within the South African context, protected areas typically generate insufficient revenues to finance operations and cover costs, and as such,

most are managed at a loss (Dube 2011; Wale and Motau 2018). This is concerning as increased pressures on protected areas, especially in Africa, will lead to increased management costs (Chardonnet 2019). Funding these costs will be a major risk to protected area systems in the future with figures of up to \$20/ha per annum being calculated (Lindsey et al. 2017; Chardonnet 2019). If protected areas cannot contribute to these costs via revenue generation through tourism, for example, questions may be raised relating to Risks 4, 5 and 14 above in so far as preferable land use options are concerned.

Risks 17 and 18, which relate to the capacity of management authorities to undertake conservation actions together with rehabilitation and restoration actions, link with many of the risks discussed above dealing with budget, skills and competencies (Pringle 2017). If management authorities are unable to undertake their management activities, protected areas will not be able to meet the objectives for which they have been established. Risk 18 is also based on the assumption that protected areas and management authorities can indeed meet their objectives and are motivated to rehabilitate and restore degraded systems, even though it is often perceived to be easier and less resource intensive to conserve than to restore (Possingham et al. 2015).

The South African protected area system specifically emphasizes intergovernmental- or cooperative governance (Risk 19) along with sound public consultation as activities related to the protected areas system (Risk 20). The rationale for intergovernmental cooperation is to ensure that protected areas are not managed in isolation and as islands within the broader governance framework and picture; and that government departments and authorities, together with protected area management authorities, are aligned in terms of strategies and decisions which may affect each other. The requirement for public consultation stems from the fact that within the South African context, protected areas, apart from private nature reserves, are mainly a function of public administration, and they are thus required to consult with the public on matters relating to the management of these areas. This usually happens with regard to developments in the protected areas through EIA processes (Alberts et al. 2021), as well as annual communication of protected area activities in the form of annual reports. Failure to effectively communicate and consult with the public could result in public buy-in being lost for protected areas, resulting in a shift in societal values related to Risk 1 as discussed above.

Risk 21 occurs when the government is unable to adequately secure sufficient areas to meaningfully reach conservation targets or goals. Internationally, there is a general understanding that global and regional conservation targets cannot be achieved only through conventional wisdom of conservation on state-owned land (Stolton et al. 2014; Mitchell et al. 2018). This is due to a general rollback of state-funded conservation plans, together with a decline in public resources aimed at conservation initiatives, and governments' growing inability to manage existing conservation estates (Pasquini et al. 2009; Watson et al. 2014; Kamal et al. 2015; Gooden and 't Sas-Rolfes 2019; Retief et al. 2022).

There is a consensus that protected areas must provide a sustainable flow of goods and services (Risk 22) also contributing to human, social, cultural, spiritual, and economic development (Risk 24). Naidoo et al. (2019) in what they consider to be the largest and most comprehensive socioeconomic-environmental dataset yet assembled, conclude that

protected areas have no negative impacts on human well-being. They suggest that protected areas may positively affect human wellbeing for those living near these areas when considering issues such as wealth, the likelihood of poverty and child health indicators such as height for age. Buckley et al. (2019) have found that the improved mental health of visitors is conservatively estimated to be worth US\$6 trillion per annum which is an order of magnitude greater than the global value of protected area tourism and two to three orders greater than the global aggregate protected area management budgets. Oldekop et al. (2015) have found that there appears to be a correlation between protected area effectiveness and the degree to which protected areas contribute toward positive social and economic outcomes when considering 165 protected areas and published data from 171 studies. The authors contend that conservation and development objectives may be synergistic, highlighting the need to consider management strategies that increase the probability of both conservation performance and development outcomes.

In achieving this, protected areas within the South African context will then arguably partly deliver on the Section 24 environmental right (Risk 25) in so far as human health, wellbeing and socio-economic development are concerned. The long-term impact of protected areas on what is expected in terms of Section 24 is difficult to measure given the subjective nature of the right. It is, however, evident that protected areas contribute positively to Section 24(a) in contributing to an environment that is not harmful to our health and well-being. Moreover, it is undeniable that protected areas contribute to realising the rights encapsulated in Section 24(b). Taking protected areas out of the conservation equation, therefore, creates a risk of not only damage to the conservation estate but potentially failing the constitutional mandate created by Section 24.

Conclusion and recommendations

This paper aimed to identify the risks posed to protected area systems through the application of the ToC to the South African context. This resulted in the identification of a total of 25 key risks. Understanding the risks to the protected area system allows a better grasp of the potential failure of the protected area system to meet its objectives as contained within the law and policy on which the system is designed. Furthermore, it allows for an evaluation and understanding of the effectiveness of the system. The application of the ToC allows not only for the identification of the risks posed to the South African protected area system but also allows for the holistic consideration of these risks along with a causal narrative concerning the different system components, from design, inputs, activities, outputs, outcomes and impact.

It is recognised that certain risks are central in their relation to others and are pivotal in the achievement of the protected areas systems objectives. An example is risks 1 and 2, namely a society that does not value protected areas and conservation. Should this be true, the entire protected area system is in jeopardy given the need for law and policy to reflect societal values. The identification of the risks allows for proactive intervention or mitigation. For example, should it be found that risks 7 or 8 relating to law enforcement or enforcement of boundaries are manifesting, then measures can

be taken to address these risks through appropriate or relevant interventions. This also applies to risk 17, dealing with the training of conservation professionals and officials, which is already receiving attention within the South African context through dedicated tertiary training institutions and courses.

It is recommended that the individual risks be further explored within protected area systems and that further research be undertaken to better understand the causal nature of the identified risks. Furthermore, the likelihood and the severity related to each of the identified risks should be explored. This will allow for a focused approach in dealing with the identified risks in this paper and allow governments and other conservation stakeholders such as NGOs, academia, and the private sector to better channel resources towards researching the identified risks as highlighted by the ToC.

Although difficult to rank, it is the contention of the authors that key risks requiring greater research focus are those relating to the way society values conservation and protected areas as well as the expected financial independence or viability of protected areas. Other important research areas relate to the risks in terms of skills and competencies as well as enforcement of protected areas laws.

This paper is a first attempt at trying to understand the underlying risks faced by the policy and legal framework within which a particular country designates, declares, and manages its protected areas. Although specifically focusing on the South African context, the authors believe that many of the risks identified are relevant to other jurisdictions and that learning from the South African case can help other countries adequately identify and mitigate risks posed to their own protected area systems. Given the increased importance of protected areas in conserving biodiversity world-wide and the increased pressures faced by these areas, it is imperative to gain a better understanding of how they are designed in law and policy and to better understand the risks posed to the achievement of their objectives to cement and ensure their continued existence.

References

- Africa Geographic (2021) Lower Zambezi copper mine given the go-ahead. <https://africageographic.com/stories/copper-mine-in-lower-zambezi-np-given-the-go-ahead/> [Accessed 28 February 2022]
- Akella AS, Cannon JB (2017) Strengthening the weakest links strategies for improving the enforcement of environmental laws globally. In *Transnational Environmental Crime*. Routledge, London, 459–492. <https://doi.org/10.4324/9781315084589-28>
- Alberts R, Retief F, Roos C, Cilliers D, Arakele M (2020) Re-thinking the fundamentals of EIA through the identification of key assumptions for evaluation. *Impact Assessment and Project Appraisal* 38(3): 205–213. <https://doi.org/10.1080/14615517.2019.1676069>
- Alberts RC, Retief FP, Cilliers DP, Roos C, Hauptfleisch M (2021) Environmental impact assessment (EIA) effectiveness in protected areas. *Impact Assessment and Project Appraisal* 39(4): 290–303. <https://doi.org/10.1080/14615517.2021.1904377>

- Alers M, Bovarnick A, Boyle T, MacKinnon K, Sobrevila C (2007) Reducing threats to protected areas: Lessons from the field. World Bank, New York, 102 pp.
- Apps K, Dimmock K, Llyod DJ, Huveneers C (2019) What values do tourists place on a marine protected area? White Shark Cage-Dive Tourists and the Neptune Islands. *Tourism in Marine Environments* 14(1): 19–30. <https://doi.org/10.3727/154427319X15567690274868>
- Balfour D, Barichiev C, Gordon C, Brett R (2019) A theory of change to grow numbers of African rhino at a conservation site. *Conservation Science and Practice* 1(6): 1–9. <https://doi.org/10.1111/csp2.40>
- Barlow A, Greenwood-Barlow C, Boddam-Whetham L, Robinson B (2016) A rapid assessment of the current status of project management skills in the conservation sector. *Journal for Nature Conservation* 34: 126–132. <https://doi.org/10.1016/j.jnc.2016.10.003>
- Belote RT, Dietz MS, Jenkins CN, McKinley PS, Irwin GH, Fullman TJ, Leppi JC, Aplet GH (2017) Wild, connected, and diverse: Building a more resilient system of protected areas. *Ecological Applications* 27(4): 1050–1056. <https://doi.org/10.1002/eap.1527>
- Biggs D, Courchamp F, Martin R, Possingham HP (2013) Legal trade of Africa's rhino horns. *Science* 339(6123): 1038–1039. <https://doi.org/10.1126/science.1229998>
- Biggs D, Cooney R, Roe D, Dublin H, Allan J, Challender DWS, Skinner D (2015) Engaging local communities in tackling illegal wildlife trade: Can a 'Theory of Change' help? International Institute for Environment and Development, London, 27 pp.
- Biggs D, Cooney R, Roe D, Dublin HT, Allan JR, Challender DW, Skinner D (2017) Developing a theory of change for a community-based response to illegal wildlife trade. *Conservation Biology* 31(1): 5–12. <https://doi.org/10.1111/cobi.12796>
- Blackmore A (2018) Rediscovering the origins and inclusion of the public trust doctrine in South African environmental law: A speculative analysis. *Review of European. Comparative & International Law* 27(2): 187–198. <https://doi.org/10.1111/reel.12239>
- Blackmore A (2022) To be or not to be a protected area: A perverse political threat. *Bothalia* 52(1). <https://doi.org/10.38201/btha.abc.v52.i1.4>
- Blickley JL, Deiner K, Garbach K, Lacher I, Meek MH, Porensky LM, Wilkerson ML, Winford EM, Schwartz MW (2013) Graduate student's guide to necessary skills for nonacademic conservation careers. *Conservation Biology* 27(1): 24–34. <https://doi.org/10.1111/j.1523-1739.2012.01956.x>
- Bruyere BL (2015) Giving direction and clarity to conservation leadership. *Conservation Letters* 8(5): 378–382. <https://doi.org/10.1111/conl.12174>
- Buckley R, Brough P, Hague L, Chauvenet A, Fleming C, Roche E, Sofija E, Harris N (2019) Economic value of protected areas via visitor mental health. *Nature Communications* 10(1): 1–10. <https://doi.org/10.1038/s41467-019-12631-6>
- Business Daily (2018a) Tanzania tenders for logging of UNESCO designated Selous game reserve. <https://www.businessdailyafrica.com/bd/news/east-africa/tanzania/tanzania-tenders-for-logging-of-unesco-designated-selous-game-reserve-2202516> [Accessed on 6 June 2022]
- Business Daily (2018b) Fresh concerns as Tanzania makes mineral discoveries in Selous reserve. <https://www.businessdailyafrica.com/bd/news/east-africa/tanzania/fresh-concerns-as-tanzania-makes-mineral-discoveries-in-selous-reserve-2202946> [Accessed on 6 June 2022]
- Carnie T (2021) Ndumo Game Reserve: The complicated balancing act of subsistence farming and nature conservation in KwaZulu-Natal. <https://www.dailymaverick.co.za/article/2021->

- 12-06-ndumo-game-reserve-the-complicated-balancing-act-of-subsistence-farming-and-nature-conservation-in-kwazulu-natal/ [Accessed 28 February, 2022]
- Carnie T (2022) Desperate land invasions condemn South Africa's wildlands to 'death by a thousand cuts'. <https://www.dailymaverick.co.za/article/2022-04-05-desperate-land-invasions-condemn-south-africas-wild-lands-to-death-by-a-thousand-cuts/> [Accessed 2 June 2022]
- Chardonnet B (2019) Africa is changing: Should its protected areas evolve. Reconfiguring the protected areas in Africa. International Union for the Conservation of Nature PAPACO. https://conservationaction.co.za/wp-content/uploads/2019/03/etudesAP_configAP_EN.pdf [Accessed 6 June 2022]
- Child B (2013) Parks in transition: Biodiversity, rural development and the bottom line. Routledge, London, 266 pp.
- Clare H (2018) Vision and vulnerability: thoughts on leadership and conservation. *Studies in Conservation* 63(sup1): 64–69. <https://doi.org/10.1080/00393630.2018.1471893>
- Coad L, Watson JE, Geldmann J, Burgess ND, Leverington F, Hockings M, Knights K, Di Marco M (2019) Widespread shortfalls in protected area resourcing undermine efforts to conserve biodiversity. *Frontiers in Ecology and the Environment* 17(5): 259–264. <https://doi.org/10.1002/fee.2042>
- Connell J, Kubisch A (1998) Applying a Theory of Change Approach to the Evaluation of Comprehensive Community Initiatives: Progress, Prospects and Problems. In: Fulbright-Anderson K, Kubisch A, Connell J (Eds) *New Approaches to Evaluating Community Initiatives*, vol. 2, Theory, Measurement, and Analysis. Aspen Institute, Washington, DC, 16 pp.
- Critchlow R, Plumptre AJ, Alidria B, Nsubuga M, Driciru M, Rwetsiba A, Wanyama F, Beale CM (2017) Improving law-enforcement effectiveness and efficiency in protected areas using ranger-collected monitoring data. *Conservation Letters* 10(5): 572–580. <https://doi.org/10.1111/conl.12288>
- de Marques AAB, Peres CA (2015) Pervasive legal threats to protected areas in Brazil. *Oryx* 49(1): 25–29. <https://doi.org/10.1017/S0030605314000726>
- DEFF [Department of Environment Forestry and Fisheries] (2021) South Africa protected areas database - second quarter 2021. Pretoria, South Africa. <http://egis.environment.gov.za>
- Doak DF, Bakker VJ, Goldstein BE, Hlae B (2015) What is the future of conservation? In: Wuerthner G, Crist E, Butler T (Eds) *Protecting the wild: Parks and wilderness, the foundation for conservation*. Island Press, 394 pp.
- DPME [Department Performance Monitoring and Evaluation] (2011) *National Evaluation Policy Framework*, National Department of Performance Monitoring and Evaluation, Pretoria.
- Dube TB (2011) An analysis of alternative funding strategies for protected area management: A case study of Ezemvelo KZN Wildlife, Master of Development Finance thesis, Stellenbosch University, Stellenbosch.
- EU (2018) Parliamentary questions: Uranium mining in Tanzania – The role of the ISTC and the objectives for sustainable development. https://www.europarl.europa.eu/doceo/document/E-8-2018-002003_EN.html [Accessed 28 February 2022]
- Fischer F (2008) The Importance of Law Enforcement for Protected Areas. Don't step back! Be honest-protect! *GAIA - Ecological Perspectives for Science and Society* 17: 101–103. <https://doi.org/10.14512/gaia.17.S1.6>

- Fischer A, Naiman LC, Lowassa A, Randall D, Rentsch D (2014) Explanatory factors for household involvement in illegal bushmeat hunting around Serengeti, Tanzania. *Journal for. Nature Conservation* 22(6): 491–496. <https://doi.org/10.1016/j.jnc.2014.08.002>
- Geldmann J, Manica A, Burgess ND, Coad L, Balmford A (2019) A global-level assessment of the effectiveness of protected areas at resisting anthropogenic pressures. *Proceedings of the National Academy of Sciences of the United States of America* 116(46): 23209–23215. <https://doi.org/10.1073/pnas.1908221116>
- Gill DA, Mascia MB, Ahmadi GN, Glew L, Lester SE, Barnes M, Craigie I, Darling ES, Free CM, Geldmann J, Holst S, Jensen OP, White AT, Basurto X, Coad L, Gates RD, Guannel G, Mumby PJ, Thomas H, Whitmee S, Woodley S, Fox HE (2017) Capacity shortfalls hinder the performance of marine protected areas globally. *Nature* 543(7647): 665–669. <https://doi.org/10.1038/nature21708>
- Gooden J, 't Sas-Rolfes M (2019) A review of critical perspectives on private land conservation in academic literature. *Ambio* 49(5): 1019–1034. <https://doi.org/10.1007/s13280-019-01258-y>
- Goosen M, Blackmore AC (2019) Hitchhikers' guide to the legal context of protected area management plans in South Africa. *Bothalia-African Biodiversity & Conservation* 49(1): 1–10. <https://doi.org/10.4102/abc.v49i1.2399>
- Gray CL, Hill SLL, Newbold T, Hudson LN, Börger L, Contu S, Hoskins AJ, Ferrier S, Purvis A, Scharlemann JPW (2016) Local biodiversity is higher inside than outside terrestrial protected areas worldwide. *Nature Communications* 7(1): 1–7. <https://doi.org/10.1038/ncomms12306>
- Groenewald Y (2010) Ndumo reserve hit by invasion crime. <https://mg.co.za/article/2010-10-15-ndumo-reserve-hit-by-invasion-crime> [Accessed 28 February 2022]
- Hamilton CM, Martinuzzi S, Plantinga AJ, Radeloff VC, Lewis DJ, Thogmartin WE, Heglund PJ, Pidgeon AM (2013) Current and Future Land Use around a Nationwide Protected Area Network. *PLoS ONE* 8(1): e55737. <https://doi.org/10.1371/journal.pone.0055737>
- Henson DW, Malpas RC, D'Udine FAC (2016) Wildlife Law Enforcement in Sub-Saharan African Protected Areas – A Review of Best Practices. Occasional Paper of the IUCN Species Survival Commission No. 58. IUCN, Cambridge, UK and Gland, Switzerland, [xxii +] 65 pp. <https://doi.org/10.2305/IUCN.CH.2015.SSC-OP.58.en>
- Inogwabini BI (2020) Protected Areas: Defining the Optimum Law Enforcement Resources. Reconciling Human Needs and Conserving Biodiversity: Large Landscapes as a New Conservation Paradigm. *Environmental History* 12: 315–325. https://doi.org/10.1007/978-3-030-38728-0_22
- IUCN [International Union for the Conservation of Nature] (2016) The world now protects 15% of its land but crucial biodiversity zones left out. <https://www.iucn.org/news/secretariat/201609/world-now-protects-15-its-land-crucial-biodiversity-zones-left-out> [Accessed 28 February 2022]
- Kamal S, Kocór M, Grodzinska-Jurczak M (2015) Conservation opportunity in biodiversity conservation on regulated private lands: Factors influencing landowners' attitude. *Environmental Science & Policy* 54: 287–296. <https://doi.org/10.1016/j.envsci.2015.07.023>
- Lausche B (2011) Guidelines for Protected Areas Legislation. IUCN, Gland, Switzerland, [xxvi +] 370 pp.

- Lindsey PA, Petracca LS, Funston PJ, Bauer H, Dickman A, Everatt K, Flyman M, Henschel P, Hinks AE, Kasiki S, Loveridge A, Macdonald DW, Mandisodza R, Mgoola W, Miller SM, Nazerali S, Siegel L, Uiseb K, Hunter LTB (2017) The performance of African protected areas for lions and their prey. *Biological Conservation* 209: 137–149. <https://doi.org/10.1016/j.biocon.2017.01.011>
- Lindsey P, Baghai M, Bigurube G, Cunliffe S, Dickman A, Fitzgerald K, Flyman M, Gandiwa P, Kumchedwa B, Madope A, Morjan M, Parker A, Steiner K, Tumenta P, Uiseb K, Robson A (2021) Attracting investment for Africa's protected areas by creating enabling environments for collaborative management partnerships. *Biological Conservation* 255: e108979. <https://doi.org/10.1016/j.biocon.2021.108979>
- Magubane T (2019) Land grabbers mark plots at nature reserve. <https://www.iol.co.za/mercury/news/land-grabbers-mark-plots-at-nature-reserve-20949634> [Accessed 28 February 2022]
- Manfredo MJ, Bruskotter JT, Teel TL, Fulton D, Schwartz SH, Arlinghaus R, Oishi S, Uskul AK, Redford K, Kitayama S, Sullivan L (2017) Why social values cannot be changed for the sake of conservation. *Conservation Biology* 31(4): 772–780. <https://doi.org/10.1111/cobi.12855>
- Mascia MB, Pailler S (2011) Protected Area Downgrading, downsizing or degazettement and implications for conservation. *Conservation Letters* 4(1): 9–20. <https://doi.org/10.1111/j.1755-263X.2010.00147.x>
- Massé F (2020) Conservation law enforcement: Policing protected areas. *Annals of the Association of American Geographers* 110(3): 758–733. <https://doi.org/10.1080/24694452.2019.1630249>
- McConnell J (2019) Adoption for adaption: A theory-based approach for monitoring a complex policy initiative. *Evaluation and Program Planning* 73: 214–233. <https://doi.org/10.1016/j.evalprogplan.2019.01.008>
- Mitchell BA, Stolton S, Bezaury-Creel J, Bingham HC, Cumming TL, Dudley N, Fitzsimons JA, Malleret-King D, Redford KH, Solano P (2018) Guidelines for privately protected areas. Best Practice Protected Area Guidelines Series No. 29. IUCN, Gland, Switzerland. <https://doi.org/10.2305/IUCN.CH.2018.PAG.29.en>
- Naidoo R, Gerkey D, Hole D, Pfaff A, Ellis AM, Golden CD, Herrera D, Johnson K, Mulligan M, Ricketts TH, Fisher B (2019) Evaluating the impacts of protected areas on human well-being across the developing world. *Science Advances* 5(4): eaav3006. <https://doi.org/10.1126/sciadv.aav3006>
- Oldekop JA, Holmes G, Harris WE, Evans KL (2015) A global assessment of the social and conservation outcomes of protected areas. *Conservation Biology* 30(1): 133–141. <https://doi.org/10.1111/cobi.12568>
- Pascual U, Adams WM, Díaz S, Lele S, Mace GM, Turnhout E (2021) Biodiversity and the challenge of pluralism. *Nature Sustainability* 4(7): 567–572. <https://doi.org/10.1038/s41893-021-00694-7>
- Pasquini L, Cowling RM, Twyman C, Wainwright J (2009) Devising appropriate policies and instruments in support of private conservation areas: Lessons learned from the Klein Karoo, South Africa. *Conservation Biology* 24(2): 470–478. <https://doi.org/10.1111/j.1523-1739.2009.01344.x>

- Pearson RG (2016) Reasons to conserve nature. *Trends in Ecology & Evolution* 31(5): 366–371. <https://doi.org/10.1016/j.tree.2016.02.005>
- Possingham HP, Bode M, Klein CJ (2015) Optimal conservation outcomes require both restoration and protection. *PLoS Biology* 13(1): e1002052. <https://doi.org/10.1371/journal.pbio.1002052>
- Pringle RM (2017) Upgrading protected areas to conserve wild biodiversity. *Nature* 546(7656): 91–99. <https://doi.org/10.1038/nature22902>
- Qin S, Golden Kroner RE, Cook C, Tesfaw AT, Bray-brook R, Rodriguez C, Poelking C, Mascia MB (2019) Protected area downgrading, downsizing, and de-gazettement as a threat to iconic protected areas. *Conservation Biology* 33(6): 1275–1285. <https://doi.org/10.1111/cobi.13365>
- Republic of South Africa (1996) Constitution of the Republic of South Africa, Republic of South Africa. Government Printer, Pretoria.
- Republic of South Africa (1998) National Environmental Management Act, 107 of 1998, Republic of South Africa. Government Printer, Pretoria.
- Republic of South Africa (2003) National Environmental Management: Protected Areas Act, 57 of 2003, Republic of South Africa. Government Printer, Pretoria.
- Retief FP, Alberts RC, Roos C, Cilliers DC, Siebert F (2022) Identifying key risks to the performance of privately protected areas (PPAs) through theory of change (ToC). *Journal of Environmental Management* 308: 114575. <https://doi.org/10.1016/j.jenvman.2022.114575>
- Sandbrook C, Fisher JA, Holmes G, Luque-Lora R, Keane A (2019) The global conservation movement is diverse but not divided. *Nature Sustainability* 2(4): 316–323. <https://doi.org/10.1038/s41893-019-0267-5>
- Saporiti N (2006) Managing national parks: how public-private partnerships can aid conservation. Viewpoint: Public Policy for the Private Sector; Note No. 309. World Bank, Washington, DC. <https://openknowledge.worldbank.org/handle/10986/11185> [Accessed 28 February 2022]
- Schulze K, Knights K, Coad L, Geldmann J, Leverington F, Eassom A, Marr M, Butchart SH, Hockings M, Burgess ND (2018) An assessment of threats to terrestrial protected areas. *Conservation Letters* 11(3): e12435. <https://doi.org/10.1111/conl.12435>
- Secretariat of the Convention on Biological Diversity (2008). Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. Montreal, Technical Series no. 36, [i–vii +] 96 pp.
- Smith RJ, Muir RD, Walpole MJ, Balmford A, Leader-Williams N (2003) Governance and the loss of biodiversity. *Nature* 426(6962): 67–70. <https://doi.org/10.1038/nature02025>
- Smith MKS, Smit IP, Swemmer LK, Mokhatla MM, Freitag S, Roux DJ, Dziba L (2021) Sustainability of protected areas: Vulnerabilities and opportunities as revealed by COVID-19 in a national park management agency. *Biological Conservation* 255: e108985. <https://doi.org/10.1016/j.biocon.2021.108985>
- Stolton S, Redford KH, Dudley N (2014) The Futures of Privately Protected Areas. IUCN, Gland, Switzerland.
- Strydom HA, King ND (2018) Protected areas. In: King N, Strydom H, Retief F (Eds) *Environmental Management in South Africa – 3rd edn.*, Juta, Cape Town.

- Tadaki M, Sinner J, Chan KMA (2017) Making sense of environmental values; a typology of concepts. *Ecology and Society* 22(1): e7. <https://doi.org/10.5751/ES-08999-220107>
- Tanner R, Friemund W, van Wyk E (2010) Legitimacy and the use of natural resources in Kruger National Park, South Africa. *International Journal of Sociology* 40(3): 71–85. <https://doi.org/10.2753/IJS0020-7659400304>
- Thornton PK, Schuetz T, Forch W, Cramer L, Abreu D, Vermeulen S, Campbell BM (2017) Responding to global change: A theory of change approach to making agricultural research for development outcome-based. *Agricultural Systems* 152: 145–153. <https://doi.org/10.1016/j.agsy.2017.01.005>
- Tranquilli S, Abedi-Lartey M, Abernethy K, Amsini F, Asamoah A, Balangtaa C, Blake S, Bouanga E, Breuer T, Brncic TM, Campbell G, Chancellor R, Chapman CA, Davenport TRB, Dunn A, Dupain J, Ekobo A, Eno-Nku M, Etoga G, Furuichi T, Gatti S, Ghiurghi A, Hashimoto C, Hart JA, Head J, Hega M, Herbinger I, Hicks TC, Holbech LH, Huijbregts B, Kühl HS, Imong I, Yeno SL-D, Linder J, Marshall P, Lero PM, Morgan D, Mubalama L, N’Goran PK, Nicholas A, Nixon S, Normand E, Nziguyimpa L, Nzooh-Dongmo Z, Ofori-Amanfo R, Ogunjemite BG, Petre C-A, Rainey HJ, Regnaut S, Robinson O, Rundus A, Sanz CM, Okon DT, Todd A, Warren Y, Sommer V (2014) Protected Areas in Tropical Africa: Assessing Threats and Conservation Activities. *PLoS ONE* 9(12): e114154. <https://doi.org/10.1371/journal.pone.0114154>
- Union of South Africa (1926) National Parks Act, 46 of 1926, Union of South Africa. Government Printer, Pretoria.
- USAID (2015) Technical References for FFP Development Food Assistance Projects Bureau of Democracy, Conflict and Humanitarian Assistance Office of Food for Peace.
- Wale E, Motau K (2018) The operational competitiveness of public protected areas managed by KZN Ezemvelo Wildlife. *Koedoe* 60(1): 1–15. <https://doi.org/10.4102/koedoe.v60i1.1452>
- Watson JEM, Dudley N, Segan DB, Hockings M (2014) The performance and potential of protected areas. *Nature* 515(7525): 67–73. <https://doi.org/10.1038/nature13947>
- Weiss CH (1995) Applying a theory of change approach to the evaluation of comprehensive community initiatives: progress, prospects, and problems. In: Fullbright-Anderson K, Kubisch AC, Connell JP (Eds) *New approaches to evaluating community initiatives: concepts, methods and contexts*, vol 1. The Aspen institute, Washington DC, 65–92.
- Whitfield J (2003) Corruption is undermining conservation. *Nature*. <https://doi.org/10.1038/news031103-12>
- World Wildlife Fund for Nature (WWF) (2017) No more mining in Selous Game Reserve. <https://www.panda.org/?300615/No-More-mining-in-the-Selous-Game-Reserve--Tanzania-Government> [Accessed 28 February 2022]